



## Impact of Agricultural Investment on Developing Egypt's Agricultural Sector

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**Abstract :** Agricultural investment is one of the basic means for achieving successful agricultural development, where it is the main pillar for increasing production, income, and creating new employment opportunities. The research aimed to study the efficiency of agricultural investment and its importance for Egypt's national economy in the light of the prevailing economic and political conditions, in addition to studying the impact of agricultural investment on achieving the targeted agricultural development in Egypt, gross and agricultural domestic products, agricultural income, share of the agricultural sector in gross domestic product, annual growth rate of the agricultural sector, and per capita share of the gross agricultural product over the period 2000-2013, in order to measure the importance of the agricultural sectors and economic efficiency indicators to assess the efficiency of agricultural investment. The study revealed that average value of the capital intensification coefficient amounted to LE 1.24 thousand per worker. The value ranged between a maximum of LE 1.87 thousand per worker in 2002 and LE 0.733 thousand per worker in 2012. A value higher than one for this coefficient indicates intensified activity for capital use and reduction of unemployment rate. It was also clear that in case 60% of the value of agricultural investments in 2015 about LE 11626.6 million, is allocated to plant production, especially from New Lands, reclaiming new lands. Taking into account that average value required to reclaim one feddan of land is estimated at LE 10000 under traditional irrigation, the 60% of agricultural investment's value (LE 6975.96 million) can contribute to the reclamation of 698 thousand feddans (only leveling and traditional irrigation mean). But if the same value is allocated for Greenhouse production, knowing that the cost of establishing one Greenhouse of size (9\*40m) is estimated at LE 11.5 thousand, and that 12 Greenhouses can be established on one feddan at a total cost of LE 138 thousand feddan. Therefore, Greenhouses can be established over 50.550 thousand feddans of land and supplied with appropriate irrigation system to be ready for planting seedlings. It should be noted that this cost is based on the prices of 2015, which means that the cost will be higher in future years. Therefore, the research recommended attracting new investments to the agricultural sector proportionate to share in Gross Domestic Product and Value Added, in addition to allocating investments to plant production in particular due to its high contribution to agricultural income that reached 68.26%. The research also suggested that allocating 60% if the value of agricultural investments for the year 2016 can lead to reclaiming 690 thousand feddan; and recommended offering the lands included in the Development Plan for individuals under usufruct system after reclamation, taking into account that profit per pound invested in new land is 1.74% higher than that invested in Old Land.

**Keywords:** Agricultural investment efficiency, the investment in greenhouses, the impact of investment on agricultural development.

## Introduction

Agricultural investment is one of the basic means for achieving successful agricultural development. It is the main pillar for increasing production, income, and creating new employment opportunities. It is worth noting that the success of any agricultural development process lies in its ability to increase the available size of investment and proper distribution between various programs to achieve maximum use efficiency. This of course requires directing the implemented economic policies toward increasing the size of total investments in general, and agricultural investments in specific, which helps the agricultural sector achieve the highest possible productivities that contribute to raising self-sufficiency rates [1].

The concept of the economic development process relies on inducing changes in the production structure through transforming from a production structure that depends on primary products to a production structure characterized by high contribution to industrial production relative to the Gross National Product. When interest rates are reduced, businessmen usually establish more investment projects, which boost the national investment, and vice versa. Investment is one of the factors responsible for changing demand at the macro level, which can be explained by the fact that investment leads to adding new projects that contribute to increasing production and exports, and reducing commodity imports, leading to improving the balance of trade. Egypt's deficit in the balance of trade amounted to LE 258.27 billion in 2013.

Generally speaking, higher production leads to higher supply of commodities and less inflation. Higher national investment leads to higher national income, which helps increase per capita income and savings, which in turn helps in more investments. Therefore, investment is considered a flowing variable that plays an effective role in finding solutions for Egypt's economy. In other words, investment motivates the wheels of economic development [2], in addition to absorbing part of the unemployed force, which helps limit the problem of unemployment that reached 23% in 2013.

## The Concept of Investment

Investment is the formation of capital in the production process, i.e., the production of intermediate commodities used in the production of final commodities. It is also known as the transformation of inputs into capital assets that contribute to the creation and boosting of production. In case domestic savings are lower than investment needs, borrowing can be made from external sources, while higher domestic savings can be invested in another country, known as the flight of surplus investment. However, the generated income goes into the National Income Accounts of the owner country. It should be noted that there is a difference between investment and capital. Investment is a dynamic variable referring to the formation or production of monetary and in-kind capital assets (cash money, shares, bonds, machinery), whereas capital is the static variable, or the capital assets. This means that investment includes both cash and in-kind capital, and it is part of the spontaneous investment. Autonomous Investment is a variable that does not depend on the level of income, but on the technological change and country politics. Induced Investment on the other hand represents individual investments, and it changes with the level of income [3].

## Research Problem

The agricultural sector represents a great importance in the Gross Domestic Product and the National Income given the fact that it feeds humans, animals, and the industry. Gross Domestic Product is a mirror that reflects the standard of living for individuals in a society. The research investigates the problem of the low share of agricultural investments thus low contribution of available agricultural resource, and higher prices of inputs, which resulted in higher prices of agricultural commodities, especially food commodities. The share of agricultural investments in national investments declined from 1043% in 2000 to 3.41% in 2013, i.e., 5.14% on average for the study period 2000-2013, whilst the shares of investment in other economic sectors have been increasing. This has resulted in negative impacts on the performance of the agricultural sector represented in lower rates of agricultural development in Egypt, an issue that requires formulating economic policies that aim to increase investments in the agricultural sector in order to achieve the targeted development goals and realize the highest rate of self-sufficiency in strategic food crops, and non-food crops produced by the sector.

## Research Objective

The research aims to study the efficiency of agricultural investment and its importance for Egypt's national economy in the light of the prevailing economic and political conditions, in addition to studying the impact of agricultural investment on achieving the targeted agricultural development in Egypt.

## Methodology and Sources of Data

The research relied on simple statistical analysis tools like the relative importance and averages, in addition to assessing economic efficiency indicators to measure the efficiency of agricultural investment. The research also estimated regression equations to identify the evolution of national and agricultural investments, gross and agricultural domestic products, agricultural income, share of the agricultural sector in gross domestic product, annual growth rate of the agricultural sector, and per capita share of the gross agricultural product over the period 2000-2013. The research relied on two types of data, the first is secondary data published on the electronic websites of the Central Agency for Public Mobilization and Statistics and the World Bank, in addition to bulletins of the Central Bank of Egypt issued over the period 2000-2013. The second is primary data collected during the agricultural season 2014/2015 through personal interviews with a number of investors in green houses by a questionnaire that was designed to serve the research purpose.

## First: Various Investment Sectors in Egypt and Main Economic Indicators Over the Period 2000-2013

Data in Table (1) indicates that average investments in Egypt amounted to LE 147.85 billion for the period 2000-2013. It is clear that the oil sector absorbed the largest share of this investment, estimated at 16.33%, followed by the transportation sector (11.4%), the electricity sector (7.07%), and finally came the agricultural sector (5.14%). Data in Table (2) indicates that total investment, gross domestic product, agricultural employment, total exports and imports, and deficit in the balance of trade increased to LE 160 billion, LE 12223.2 billion, LE 2.157 million workers, LE 181.2 billion, LE 405.4 billion, and LE 224.2 billion in 2013, respectively, which are 169.1%, 386.6%, 42.6%, 1098.4%, 801.2%, and 657.5% higher compared to 2000. The table also indicates that agricultural exports and imports accounted for 10.05% and 10.37% of the total exports and imports. It is also clear that agricultural investments accounted for 5.14% of the total investments, agricultural loans accounted for 17.04% of the total loans, and agricultural savings accounted for 6.05% of the total savings.

Table (1) The evolution of national and agricultural investments, the most important economic sectors and their relative importance during the period 2000 – 2013 (Value per Million LE)

Sectors \ Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	period Average (2000-2013)	Change Percent during the period
Agriculture	8510	8133	8711	6102	7559	7420.2	8043.8	7791.2	7239.9	6688.6	6562.5	6833.7	5370.7	8246.3	7372.28	52.56 -
The electricity and water	3364	3121	6507.45	9893.9	8689	9551.2	9008.1	11563.1	16107.6	20652.1	23503.5	22076.5	21669.8	24209.2	13565.5	87.1
Transport , Communications and the Suez Canal	1130	1847	6756.9	11667	17950	19166	23151	25576	19952.4	14328.7	20224	20042	16302	19749.4	15560.2	95.58
Petroleum and its products	8849	7351	7079.1	6807.2	5743.6	12704	14504	41909.4	39931.8	37954.1	42183	44726	62366	58280.4	27884.9	90.79
The total investment	81611	83031	75567	68103	79556	96456	115741	155342	176231	197119	224400	229066	246068	241612	147850.2	-
% The agriculture sector	10.43	13.63	11.52	8.96	9.5	7.69	6.95	5.02	4.11	3.39	2.92	2.98	2.18	3.41	5.14	84.01 -
% The electricity and water sector	4.12	3.76	8.61	14.53	10.92	9.9	7.78	7.44	9.14	10.48	10.47	9.64	8.81	10.02	7.07	65.57
% Transport and Communications and the Suez Canal	1.38	2.22	8.94	17.13	22.56	19.87	20	16.46	11.32	7.27	9.01	8.75	6.63	8.17	11.41	90.16
% Petroleum and its products	10.84	8.85	9.37	10	7.22	13.17	12.53	26.98	22.66	19.25	18.8	19.53	25.34	24.12	16.33	73.24

Source: collected and calculated from the Central Agencyfor Public Mobilization and Statistics data- economic sector,different volume(2000-2013

Table (2) The evolution of the National Investment, domestic product indicators, exports , imports, and their relative importance , the trade balance , the agricultural sector contribution percentage and its growth rate during the period (2000 – 2013)

The year	total investment (million pounds)	gross domestic product (million pounds)	% agricultural exports of the total	% agricultural imports of the total	number of agricultural workers (thousand workers)	% agricultural investments of the total investment	total exports per billion	total imports per billion	trade balance	percentage contribution of the agricultural sector in GDP	% agricultural loans of total loans	% agricultural savings of the total	the agriculture sector's annual growth rate
2000	81611	316404	10.91	14.23	5065	10.43	16.5	50.6	-34.1	16.7	15.51	17.79	2
2001	83031	338600	13.74	15.58	5154	13.63	21.1	56.5	-35.4	16.26	17.89	16.06	2.2
2002	75567	363144	11.14	15.21	5119	11.53	36.8	65.1	-28.3	16.07	17.85	15.93	2.9
2003	68103	390619	12.16	11.79	5206	8.96	47.7	79.7	-32	16.34	16.55	14.07	2.5
2004	79556	456322	10.06	12.04	5282	9.5	61.6	114.6	-53	15.18	15.67	2.5	3
2005	96456	506511	6.22	10.9	5243	7.69	78.8	118.3	-39.5	14.86	15.59	2.39	3.3
2006	115741	581144	5.92	10.1	5333	6.95	91.2	152.5	-61.25	14.07	17.72	2.42	3.2
2007	155342	686430	7.62	7.09	5427	5.02	143	287.7	-144.7	13.8	17.58	2.43	3.7
2008	176231	895502	10.16	10.56	7877	4.11	134.8	249.9	-115.1	15.13	15.95	0.9	3.3
2009	197119	1042200	11.98	8.76	7626	3.39	151.1	300.2	-149.1	15.45	15.14	2.17	3.2
2010	224400	1206600	9.97	7.52	7358	2.92	182.6	351	-168.4	15.76	18.58	2.29	3.5
2011	229066	1371100	9.82	6.76	7494	2.98	188.35	371.4	-183.1	15.91	16.59	2.21	2.7
2012	246068	1542300	10.76	6.85	7323	2.18	178.51	433.7	-255.2	16.2	17.51	2.05	2.9
2013	241612	1539594	10.17	7.79	7221.8	3.41	197.72	456	-258.3	14.6	20.35	1.53	3
Average	147850.2	802605	10.05	10.37	6194.9	5.14	109.27	220.5	-111.3	15.45	17.04	6.05	2.96

Source: collected and calculated from the Central Agency for Public Mobilization and Statistics data - economic sector, different volume (2000-2013)

## Second: Assessing the Efficiency of National and Agricultural Investments

Investment is one of the factors capable of inducing changes in the structure of the national economy. Investments also contribute to creating new employment opportunities and achieving high rates of growth. Therefore, the success of agricultural development policy depends on the size of available investments and efficiency of utilization[2]. Investment efficiency can be assessed using the following group of indicators, presented in Table (3):

**1. Return On National Or Agricultural Investment = National or Agricultural Product/National or Agricultural Investment [4]**

A value higher than one for this indicator means that there is sufficient efficiency for investment. Results indicate that the value of this indicator reached a maximum of 6.33% in 2012, whilst the period's average amounted to 5.4%.

**2. Rate of National or Agricultural Investment = National or Agricultural Investment/Gross Domestic or Agricultural Product [3]**

A value less than one for this indicator means there is sufficient efficiency for investment, whereas a value higher than one means the opposite. Results indicate that the period's average for this indicator amounted to 0.184 and 0.061 for national and agricultural investments, respectively, which means higher efficiency of the agricultural sector as both are less than one.

**3. National or Agricultural Investment Multiplier = Change in the Gross Domestic or Agricultural Product/Change in the National or Agricultural Investment [5]**

A value higher than one for this indicator means there is efficiency in investment. Results indicate that the period's average value of National or Agricultural Investment Multiplier reached 68.63 and 16.27, respectively.

**4. Resettlement of Agricultural Investments' Coefficient = Agricultural Investment/Total Investment \* Gross Domestic Product/Agricultural Domestic Product [6]**

A value less than one for this coefficient means that the agricultural sector receives investments less than its contribution to the Gross domestic Product, whereas a value greater than one means that the sector receives investments higher than its contribution to the Gross domestic Product. Results revealed that the period's average value of Resettlement Coefficient amounted to 0.33, and ranged between a maximum of 0.84 in 2001 and a minimum of 0.13 in 2012.

**5. Coefficient of Employment or Capital Intensification: refers to the size of investment in the sector divided over total labor in the sector. The result is the worker's share of investment in that sector.**

The lower the value of this coefficient indicates that the number of workers in the sector is higher than the size of investment. Therefore, this coefficient reflects the sector's contribution to reducing the size of unemployment. Results revealed that the period's average value of capital intensification coefficient amounted to LE 1.24 thousand per worker. The value ranged between a maximum of LE 1.87 thousand per worker in 2002 and LE 0.733 thousand per worker in 2012.

It is worth noting that a value higher than one for this coefficient indicates that the agricultural sector has an intensified activity for capital use and reducing the rate of unemployment.

**6. Marginal Rate of Agricultural Capital: expresses the change in capital (investment) to the change in product. It measures what an additional unit of the product requires from capital units.**

A value less than one for this indicator means that the marginal product of the sector requires less capital units due to the better economic and technical or productive efficiency of investments. This indicator also measures the optimum distribution of resources between economic sectors [6].

Results indicate that the period's average value of marginal rate of agricultural capital amounted to 0.79. A low value of this indicator means there is an improve in the economic efficiency of investment, either technical or production efficiency. The occurrence of negative values during last years can be attributed to the low investment directed to the agricultural sector during these years, despite resulting in higher domestic production, indicating higher efficiency of investment in the agricultural sector.

**7. Value Added: expresses the ratio of value added of Gross Domestic Product for each sector.**

Results indicate that value added in the industrial and services sector increased by 1.09% and 3.41% in 2013 compared to 2000. As regards the agricultural sector, value added declined from 7.16% in 2000 to 5.14% in 2013 4.22% on average. Such decline indicates the low investment directed to the agricultural sector.

Table (3) Investment efficiency indicators during the period ( 2000 – 2013)

% added value for the services sector of GDP	% added value for the industry sector of GDP	% added value for the agriculture sector of GDP	Agricultural investment rate	the agricultural capital marginal rate	National Investment rate	Agricultural capital intensification coefficient (Employment) (million pounds per thousand workers)	Agricultural endemism coefficient	return of agricultural investment	Agricultural investment multiplier	National Investment multiplier	Return of investment	The year
1.5	1.33	7.16	0.161	1.27	0.258	1.606	0.62	6.21	0.79	13.7-	4.91	2000
1.5	3.33	6.16	0.206	-0.79	0.245	1.59	0.84	4.86	-1.27	34.8	5.33	2001
7.48	8.34	5.16	0.149	-0.48	0.208	1.874	0.72	6.7	-2.09	2.4	5.43	2002
0.48	7.35	3.16	0.096	0.27	0.174	1.23	0.55	10.46	3.73	1.7-	5.7	2003
0.48	9.36	2.15	0.109	-0.02	0.174	1.431	0.63	9.16	-43.51	4.7	5.7	2004
8.48	3.36	9.14	0.099	0.1	0.19	1.415	0.52	10.15	10.38	43.4 -	5.25	2005
5.47	4.38	1.14	0.098	-0.02	0.199	1.497	0.49	10.17	-51.41	11.5	5	2006
2.49	7.36	1.14	0.082	-0.01	0.226	1.436	0.36	12.16	-73.84	68.1 -	4.49	2007
9.48	8.37	2.13	0.053	-0.02	0.197	1.025	0.27	18.71	-46.27	144.7	4.5	2008
8.48	6.37	6.13	0.042	-0.004	0.189	0.9	0.22	24.07	-231.8	21.1 -	5.29	2009
5.48	5.37	0.14	0.035	0.01	0.186	0.916	0.19	28.98	103.24	<b>245.2-</b>	5.2	2010
9.47	6.37	5.14	0.031	-0.05	0.167	0.912	0.19	31.93	-21.67	309.1	6	2011
3.46	2.39	5.14	0.021	-0.11	0.16	0.733	0.13	46.53	-8.73	21.7-	6.53	2012
4.46	2.39	5.14	0.037	0.01	0.157	0.769	0.23	27.26	156.54	-26.8	6.25	2013
4.91	5.43	4.22	0.061	0.06	0.184	1.24	0.33	16.27	16.27	68.63	5.4	<b>Average</b>

Source: Calculated from Table (2)



### Third: Investment and Developing the Agricultural Sector

The research devoted attention to identifying the main agricultural subsectors that investments should be allocated for. It is well known that the basic components of the agricultural sector include: plant production subsector, animal production subsector, and fish production subsector. A comparison between each subsectors' contribution to agricultural income must be done in order to specify where investments should be allocated. It is clear from Table (4) that plant production subsector's contribution to agricultural income is estimated at 68.26%, followed by animal production subsector, with contribution estimated at 23.11%. Fish production subsector ranked last with contribution to agricultural income estimated at 8.63%. It can also be noted that contributions of plant production inputs' value, animal production inputs' value, and fish production inputs' value to total value of agricultural inputs amounted to 32.16%, 65.66%, and 2.19%, respectively. Such results indicate the necessity to allocate the majority of investment, estimated at LE 7372.28 on average for the period 2000-2013, to plant production subsector. Plant production activity depends on cultivating Old and New Lands, and Greenhouses. And despite Old lands are characterized by high production value and net revenue, in addition to low value of inputs compared to New lands and Greenhouses, it is not economically feasible to allocate investments to Old Lands due to its limited area and difficulty to add new areas to the currently available ones. However, increasing production from Old Lands depends on vertical expansion, which can be achieved by using high yielding varieties and modern farming technologies. As regards production from New Lands and Greenhouses, horizontal expansion requires reclaiming new areas and establishing new Greenhouses, in addition to adopting Good Agricultural Practices that depend on transfer of the know-how technology. After the change in political conditions that accompanied the 30<sup>th</sup> of June Revolution, the Government of Egypt (GOE) embarked on applying the policy of horizontal expansion through reclaiming new lands. GOE's comprehensive development plan included reclaiming one million feddan distributed as follows: 420 thousand feddans in Western Menia, 150 thousand feddans in Maghfira region, 96 thousand feddans in Old Farafrah, 120 thousand feddans in New

**Table (4) production output value , production inputs value and net income for the production of plant , animal production and fish production and their proportion contribution in Agricultural income and the total output value and production inputs of the agricultural sector and net income (Value per million pounds)**

The year	Plant production			Animal			fish production			Total agricultural production value	total value of agricultural production inputs	total net income of agricultural production	fish production rate Contribution rate in agricultural income	plant production rate Contribution rate in agricultural income	animal production rate Contribution rate in agricultural income	plant production inputs Ratio of the total value of the agricultural sector inputs	animal production inputs Ratio of the total value of the agricultural sector inputs	fish production inputs Ratio of the total value of the agricultural sector inputs
	Plant production value	plant production inputs	Plant net income value	Animal Production value	Animal Production inputs	Animal net income value	fish production value	fish production inputs value	fish net income									
2000	43852	7768	36084	22126	12766	9360	5686	435	5251	71664	20969	50695	10.36	71.18	18.46	37.05	60.88	2.07
2001	44744	6380	38364	24003	14233	9770	5993	506	5487	74740	21119	53621	10.23	71.55	18.22	30.21	67.39	2.4
2002	48516	6954	41562	29556	16262	13294	6188	556	5632	84260	23772	60488	9.31	68.71	21.98	29.25	68.41	2.34
2003	55537	8696	46841	34606	18994	15612	6710	617	6093	96853	28307	68546	8.89	68.34	22.78	30.72	67.1	2.18
2004	65099	9559	55540	39308	19048	20260	7428	686	6742	111835	29293	82542	8.17	67.29	24.55	32.63	65.03	2.34
2005	71911	12052	59859	47246	21315	25931	7814	716	7098	126971	34083	92888	7.64	64.44	27.92	35.36	62.54	2.1
2006	78425	12287	66138	49689	21970	27719	9305	796	8509	137419	35053	102366	8.31	64.61	27.08	35.05	62.68	2.27
2007	89858	13677	76181	55260	25038	30222	10827	923	9904	155945	39638	116307	8.52	65.5	25.98	34.5	63.17	2.33
2008	109792	17052	92740	65060	30888	34172	10814	971	9843	185666	48911	136755	7.2	67.81	24.99	34.86	63.15	1.99
2009	108657	16736	91921	69120	33607	35513	11661	1041	10620	189438	51384	138054	7.69	66.58	25.72	32.57	65.4	2.03
2010	117477	18157	99320	77382	39194	38188	14495	1290	13205	209354	58641	150713	8.76	65.9	25.34	30.96	66.84	2.2
2011	148501	19849	128652	84669	48966	35703	16819	1498	15321	249989	70313	179676	8.53	71.6	19.87	28.23	69.64	2.13
2012	160802	22509	138293	88970	52528	36442	17652	1571	16081	267424	76608	190816	8.43	72.47	19.1	29.38	68.57	2.05
2013	165027	23101	141926	97781	53756	44025	19626	1753	17873	282434	78610	203824	8.77	69.63	21.6	29.39	68.38	2.23
Average	93442.7	13912.6	79530.1	56055.4	29183.2	26872.2	10787	954.21	9832.8	160285.2	44050	116235	8.63	68.26	23.11	32.16	65.66	2.19

Source: Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Agricultural Income Bulletin, different issues of (2000-2013).[10]

Farafrah, 142 thousand feddans in Toshki behind the High Dam, 100 thousand feddans along the East Port, 10 thousand feddans in Toshki Wells Region, 30 thousand feddans in Eastern Siwa, and 50 thousand feddans in the Eastern Depression Region, which is a total of 1.118 million feddan (<http://www.youm7.com/story2015>). The average value of reclaiming one feddan of land differs according to the applied irrigation method. Therefore, it may range between LE 5 and 13 thousand, LE 10 thousand on average in case the traditional flood irrigation is applied, and reaches as high as LE 50 thousand per feddan in case sprinkler or drip irrigation is applied, (LE 22 thousand on average). [7]

#### **Fourth: Proposed Agricultural Investment Systems for the One-Million Feddan Project. [8]**

Current situation report on the One-Million Feddan Project revealed the completion of disposition of lands in the 9 regions at a cost of LE 185 thousand per feddan. The report affirmed allocating a percent of the land for the graduated youth, and defined 3 systems for land distribution.

**First System:** Usufruct for 49 years, designed for Arab and Foreign Companies for land reclamation and cultivation. This system allows allocating 5 feddans per individual in the form of shares in a joint-stock company that provides work and employment opportunities according to qualification and experience. Price per share is determined inclusive of the value of basic facilities implemented by the country, and the life of installments is determined too.

**Second System:** Usufruct for the purpose of acquisition. This system is designed for companies and associations, and imposes the condition of Egyptian contribution by 100% for development purposes. Under this system, lands are offered for acquisition in pieces ranging between 1000 and 10000 feddans through Egyptian capital companies, and priority shall be given to those companies that present comprehensive agricultural and industrial projects. The property title shall be granted to the company only after the completing the cultivation of the entire area and payment of all dues to the Government according to the schedule set.

**Third System:** Allocation of large areas ranging between 10 and 50 thousand feddans for Arab or Foreign Companies based on usufruct for 49 years, and granting them exemption from payment for a 3-year period.

**Fourth System:** this system applies for the graduated youth, small farmers, and 5% of the disables. The total area allocated for these categories amount to 207 thousand feddans. Under this system, GOE is responsible for laying the utilities and basic infrastructure. The cost per feddan is estimated at LE 185 thousand to be repaid over 49 years, i.e., LE 3776/year. Greenhouse cultivations is the proper agricultural investment activity young graduates and small farmers must rely upon, where vegetables produced under greenhouse are characterized by being available off-season and satisfying the range of quality standards and health specifications required by domestic and foreign consumer, which allows benefiting from the high sale prices. Greenhouses create many job opportunities as well, where one greenhouse absorbs about 4-5 workers, which means that one feddan requires 44-55 workers.

#### **Fifth: Investment in the greenhouses:**

The aim of cultivation under Greenhouses is producing vegetables off-season, in addition to satisfying the range of quality standards and health specifications required by domestic and foreign consumer in terms of the amounts of pesticides and chemical fertilizers residues, size, and quality, which allows benefiting from the high sale prices, and creating many job opportunities as well, where one greenhouse absorbs about 4-5 workers.

#### **Production from Greenhouses**

Production under Greenhouses is either for one, two, or three seasons, based on the produced crop.

Feasibility study for annual production of summer and winter cucumber, colored peppers, tomatoes, and green beans under one Greenhouse of size 9\*40 meter in Aswan Governorate, Nasr ElNoba District, Abrim Village (reclaimed desert lands).

Feasibility study for Main Cops Produced under Greenhouses: a feasibility study conducted on annual production from one Greenhouse of size 9\*40 m (360 m) indicate that main produced crops include summer and winter cucumber, colored peppers, tomatoes, and green beans.

Table ( 5) presents the annual operation and production costs of producing pepper, cucumber, and tomatoes per Greenhouse established on New and Old Lands. It is clear that investing in Greenhouse cultivation in newly reclaimed lands resulted in reducing production cost by LE 6909.5, i.e., 13.5% lower compared to Old Lands. This can be explained by the 43% reduction in pesticides' cost compare to Old lands, 28.6% reduction in land rent, and the 6.25% reduction in labor cost. Such reduction contributed to the lower annual cost of production in New Lands compared to Old Lands.

**Revenues and Production Costs for Main Crops Produced per Greenhouse (color pepper, tomatoes, and cucumber) in both New and Old Lands As shown in Table(6)**

**Table (5): compared to the costs of the operation and production of the most important greenhouse crops (pepper, cucumber, tomato) in both the new and old land for one of the greenhouses**

Cost Type	Statement	New reclamation land	old land
Operating costs	the value of the greenhouses Creation value includes -iron structure- -(plastic cover - the doors greenhouses the electricity cable and strings to climb and gauze - cover the tomatoes and taxi transport and installation of greenhouses - tools and equipment used in greenhouses )	11000.5	14000
	the land Rent	500	700
	Depreciation value of the greenhouse structure	250	300
Production costs	Organic fertilizers value and chemical additives such as (the agricultural sulfur)	330	250
	value includes the value Chemical fertilizer (Nitrate, calcium ,potassium sulfate .aoria, phosphoric acid, nitric acid, magnesium, ammonium nitrate, potassium nitrate)	1240	1500
	Pesticides value	300	530
	The value of colors pepper seeds varieties ( Green Fresno, red Macilia, yellow Samba )	1440	1400
	The value of Cucumber seeds class ( Vivlsn ) summer	750	850
	The value of wintry Cucumber seeds class (Barracuda)	660	600
	The value of tomato seeds class(Sherry)	690	740
	value of labor wages	15000	16000
	The value of the supervision and management incidental expenses	12000	14000
Operating and production costs	Total annual costs	54460	51370

Source: collection and Calculated from the questionnaires with investors in agriculture greenhouses. [11]

**Table (6): revenues and costs of the production of the most important greenhouse crops (pepper, cucumber, tomato) in both the new and old land for one of the greenhouses.**

The crop	New land (land reclamation)			old land		
	The production amount ( per Kilo)	Kilo price per pound	total revenue	The production amount ( per Kilo)	Kilo price per pound	total revenue
pepper green	2500	3.5	8750	2200	4	8800
Red yellow and pepper	2000	4.5	9000	2000	5	10000
Summer cucumber	7000	1.5	10500	7500	1.75	13125
Winter cucumber	6000	1.75	10500	6000	2	12000
Sherry (Tomatoes)	6000	1.75	10500	6000	2	12000
Total revenue for one of the greenhouses	-	-	49250	-	-	55925
costs for one Total the greenhouses of			44460.5			51370
Net return for one of the greenhouses			4789.5			4555

Source: collection and Calculated from the questionnaires with investors in agriculture greenhouses

Payback Period for Capital Invested in a Greenhouse Criterion:

Capital Payback Period = Initial Investment/Average Annual Profit

Pepper, cucumber, tomatoes (New Land) =  $11000.5/4789.5 = 2.3$  years

Pepper, cucumber, tomatoes (Old Land) =  $14000/4555 = 3.1$  years

Pepper, Green Beans, tomatoes (New Land) =  $11000.5/2849.5 = 3.8$  years

Pepper, Green Beans, tomatoes (Old Land) =  $14000/4555 = 3.1$  years

Table (7) indicates that invest profit for a Greenhouse established in New Land is higher by LE 0.019 compared to that obtained from a Greenhouse established in Old Land, i.e., 1.74% higher. It is also clear that interest rates on investment made in establishing a Greenhouse in New and Old Land amounted to 10.8% and 8.9%, respectively, which are higher by 3.8% and 1.9% than bank interest rate estimated at 7.5%.

Table (8) presents the operation and production costs for main crops grown under Greenhouse (pepper, green beans, tomatoes) in New and Old lands. It is clear that investing in establishing a Greenhouse in newly reclaimed land has resulted in reducing production cost by LE 7019.5, i.e., 13.9% lower compared to Old Land. This can be explained by the 43% reduction in pesticides' cost compare to Old lands, 28.6% reduction in land rent, and the 6.25% reduction in labor cost. Such reduction contributed to the lower annual cost of production in New Lands compared to Old Lands. The difference between the cost per Greenhouse under which cucumber, tomatoes, and pepper are produced, and the cost per Greenhouse under which Green Beans, tomatoes, and pepper are produced is only the values of cucumber and green beans' seeds. Cucumber seeds' cost amounted to LE 1410 and LE 1450 in New and Old lands, respectively, whereas green beans seeds' cost amounted to E 350 and LE 500, respectively.

- Revenues and Production Costs for Main Crops Produced per Greenhouse (Pepper, Green Beans, Tomatoes) in both New and Old Lands As shown in Table(9)
- Table (10) indicates that invest profit for a Greenhouse established in New Land is higher by LE 0.019 compared to that obtained from a Greenhouse established in Old Land 1.74% higher. It is also clear that interest rates on investment made in establishing a Greenhouse in New and Old Land amounted to 11.2% and 9.3% respectively, which are higher by 3.7% and 1.8% than bank interest rate estimated at 7.5%.

**Table (7) The annual economic efficiency criteria for feddan of greenhouses in the new and old land for the greenhouses which are grown (pepper, cucumber, tomato)**

The Statement	The new land (land reclamation)	old land
Total revenue feddan	541750	615175
Total costs per feddan	489065.5	565070
Net return ( feddan )	52684.5	50105
Return/ Invested Pound	1.108	1.089
Recover period Capital	2.3 year	1.3year
Interest rate%	10.8	8.9
bank Interest rate%	7.5	7.5

Source: collection and Calculated from the questionnaires with investors in agriculture greenhouses

**Table (8): compared to the costs of the operation and production of the most important greenhouse crops (pepper, cucumber, tomato) in both the new and old land for one of the greenhouses**

Cost Type	Statement	New reclamation land	old land
Operating costs	the value of the greenhouses Creation value includes iron structure - (plastic cover - the doors - greenhouses - the electricity cable and strings to climb and gauze to cover the tomatoes and taxi transport and installation of greenhouses - tools and equipment used in greenhouses)	11000.5	14000
	Rent the land	500	700
	Depreciation value of the greenhouse structure	250	300
Production costs	Organic fertilizers value and chemical additives such as (the agricultural sulfur)	330	250
	Chemical fertilizer value includes the value (Nitrate, calcium ,potassium sulfate .aoria, phosphoric acid, nitric acid, magnesium, ammonium nitrate, potassium nitrate )	1240	1500
	Pesticides value	300	530
	The value of colors pepper seeds varieties (Green Fresno, red Macilia, yellow Samba)	1440	1400
	The green bean seeds value 350 500	350	500
	The value of tomato seeds class(Sherry)	690	740
	value of labor wages	15000	16000
	The value of the supervision and management	12000	14000
incidental expenses	300	500	
Operating and production costs	Total annual costs	543400	50420

Source: collection and Calculated from the questionnaires with investors in greenhouses agriculture.

**Table (9): - revenues and costs of the production of the most important greenhouse crops (pepper, green bean ,tomato) in both the new and old land for one of the greenhouses.**

The crop	New land (land reclamation)			old land		
	The production amount ( per Kilo)	Kilo price per pound	total revenue	The production amount ( per Kilo)	Kilo price per pound	total revenue
pepper green	2500	3.5	8750	2600	4	9400
Red yellow and pepper	2000	4.5	9000	2000	5	10000
The green bean	4000	5	20000	4200	5.5	23100
Sherry (Tomatoes)	6000	1.75	10500	6300	2	12600
Total revenue for one of the greenhouses	-	-	48250	-	-	55100
costs for one Total greenhouses of the			43400.5			50420
Net return for one of the greenhouses			4849.5			4680

Source: collection and Calculated from the questionnaires with investors in greenhouses agriculture

**Table (10) The annual economic efficiency criteria for feddan of greenhouses in the new and old land for the greenhouses which are grown (pepper, green bean, tomato)**

The Statement	The new land (land reclamation)	old land
Total revenue feddan	530750	606100
Total costs per feddan	477405.5	554620
Net return ( feddan )	53344.5	51480
Return/ Invested Pound	1.112	1.093
Recover period Capital	3.8 year	3.1 year
Interest rate%	11.2	9.3
bank Interest rate%	7.5	7.5

Source: collection and Calculated from the questionnaires with investors in greenhouses agriculture

## Recommendations

1. Attracting new investments to the agricultural sector proportionate to share in Gross Domestic Product and Value Added because the research proved that agricultural investments have been following a downward trend at an annual rate of 2.61% during the study period.
2. Adopting investment policies to promote the agricultural sector through improving the investment environment by simplifying the procedures and laws governing the investment process, in addition to offering support to investment in the agricultural sector like that offered to other sectors.
3. Seeking to achieve economic stability through stability of exchange rate and interest rates, in addition to increasing the size of loans offered to the agricultural sector at low interest rates, and reducing the prices of agricultural inputs because those are the main factors affecting agricultural investments.
4. Allocating investments to plant production in particular due to its high contribution to agricultural income that reached 68.26%.
5. Allocating 60% if the value of agricultural investments for the year 2016 can lead to reclaiming 690 thousand feddan.
6. Offering the lands included in the Development Plan for individuals under usufruct system after reclamation.
7. In case of planting of 207 thousand fedan of greenhouses, requiring the establishment of about 19 thousand greenhouses contribute to save about 38 thousand jobs (agricultural workers), providing about 19 thousand jobs for the graduates a total of 57 thousand jobs and therefore requires the need to stimulate

graduates turnout for this type of planting by offering a full greenhouse with all necessary tools for farming.

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